Industrial Finishing

Reg. U. S. Pat. Off.

Devoted to Product Finishing in the Factory

Vol. IX, No. 4 | FEBRUARY, 1933 | $2.00 a Year

Contents of this Issue

From the Editor's Desk 5

Feature Articles

The 1933 Automobiles, by G. D. Hirst 9
Furniture Show Finishes, by R. G. Meade 11
Black Finish on Metal Chemically, by C. F. Scribner 15
Modern Developments in Wood Finish Materials—I, by M. J. Pearce 18
Selection of Colors—II, by Howard Ketcham 24
How to Ebonize Light-Colored Hardwoods—I, by E. Perry 28
Refinishing Wood Showcases and Store Fixtures, by M. M. Miller 32
What's New 36
- Wax for Many Uses.
- Clear Durable Waterwhite Varnish.
- Permite Resalum—New Aluminum Coating.
- Denatured Alcohol Formulas.

Short Articles

Letters 4
Stainless Clad Steel 10
More Air Conditioning 10
Rock Hard Water Putty 14
Hilo Sales Conference 14
Silver and Red for Decorative Effects 17
Ault & Wiborg Varnish Wks. 17
Chadwick L. Rowe 23
Despatch Oven Personnel 23
New England Lacquer Co. 27
Wood Colored in Growth 27
Smooth Surface First 30
Bramley Joins Coatings Corp. 31
Porcelain Enameled House 35
Porcelain Blackboard 38
Shellac Sample Cards Free 38
Why Electric Ovens? 39
Buying Quality; Mixing Brands 39
Veneer May Cause Checks 40
Snell's New Chemist 41
Masking Tape Stripes 45
Pressure Containers Help Small Shops 45
Metal Protective Paint 46
Churns Mix Paints 46

Editorial 44
"Classified Advertising" Section 47
Advertisers' Index 48

Published by PRACTICAL PUBLICATIONS, INC., 222 E. Ohio St., Indianapolis, Ind.
Eastern Representative—C. A. Larson
254 West 31st St., New York
Phone, Penna. 9049
Western Representative—H. L. Watrous
423 Maple Ave., Winnetka, Ill.
Phone, 904

A 4-STAR Steel Sheet

★ **1.** Superior Galvannealed is a special analysis steel sheet that is soft, ductile and easily formed.

★ **2.** A hot dip, heat treated zinc coating is ***bonded*** to the base metal rendering it rust-resisting to an unusual degree.

★ **3.** Under the most severe forming operations, the zinc coating will not chip, flake or peel.

★ **4.** Etched or mat-like surface adapted to receive paint, lacquer or enamel finishes.

The Superior Sheet Steel Company
Canton, Ohio

Division of Continental Steel Corporation

Superior Galvannealed
PATENTED PROCESS

Letters »

The names and addresses of those whose letters and inquiries appear in this department may be had by writing this office, or letters addressed to them in care of this office will be forwarded promptly.—The Editor

Paint for Galvanized Metal

1) In the January issue of INDUSTRIAL FINISHING there is an article by E. Perry on "Painting Galvanized Iron and Sheet Zinc," (page 11) and we note there is a special brand of Portland cement paint that is recommended highly. Will you kindly give us the name of the manufacturer of this paint, and oblige?—T. H. & H. Co. (Metal Partitions, Cabinets, Lockers, Enclosures).

Editor's Note: Others who inquired about this same article and material include the following:

2) R.&Co. (Architectural Cabt. Wk.)
3) P.R.Co. (Reflectors)
4) R.B.&S.C. (Metal Doors, Trim)
5) I.V.Co. (Varnishes, Lacquers)
6) T.S-F. Co. (Store Fixtures)
7) G.H.G.&Co. (Home Furnishers)
8) P.R.P.Co. (Rustproof Process)
9) A.F.S. (Auto Trimming Supls.)
10) E.A.M.Co. (Metal Specialties)
11) T.G.L.M.Co. (Aircraft)

One-Coat Finish

Will you please give us the names and addresses of the companies which have perfected a one-coat enamel finish? We are interested in such a finish if it is suitable for high-chairs and novelty furniture.—T. K. Mfg. Co. (Chairs).

Toy Dipping Finish

1) In the January issue of INDUSTRIAL FINISHING, on page 7, under the title "Developments During 1932," mention is made of a toy dipping enamel described as follows:

"Solid covering and highly lustrous;

(Continued on page 6)

From the Editor's Desk

THE SCORES OF INQUIRIES about new and improved products mentioned in the editorial columns of January INDUSTRIAL FINISHING are significant in more ways than one. In the first place they indicate that industries using finishing materials are active and alert. Whether they are going at 100% capacity or 10%, they are using materials—and what is equally important they are on the lookout for whatever offers the promise of doing their jobs better or more economically.

Second, we are reminded of the fact that a changed personnel is now in charge of selecting, buying and using finishing materials in the majority of manufacturing establishments. New signatures are on letters and orders, and new shadows of influence are behind those signatures.

Third, there has not been enough effective product advertising to keep industry informed and reminded of the latest finishing materials, their merits, their uses and their possibilities. In advertising today *it's better to play up the product rather than give so much prominence to the name of the concern that makes it.*

MUCH HAS BEEN PRINTED and said recently about stimulating the sales of many products by giving them more eye appeal—making improvements in design, color, finish and decoration. All very good, but eye appeal is not everything. There is the smell—odor—nose appeal—and it's of no small importance. Among the great variety of products that have been pleasantly scented recently, one is none other than paint.

A paint manufacturer has introduced a paint in which this feature is particularly stressed in his advertising. Instead of smelling like ordinary paint it gives off a delicate rose fragrance while being applied and while drying. The sweet smelling paint is suggested for use wherever the characteristic paint odor might be more or less objectionable—for example in educational institutions, hospitals, hotels, homes and possibly in theaters, stores and offices.

IS YOUR FINISHING room or paint shop clean, sanitary, profitable, economical? Quoting from the letter of a man who knows what is in many finishing rooms we read:

"It is a real pleasure to enter a comparatively clean japanning or painting room. They are so uncommon. It is not unusual to find 6 to 8-in. of expensive paint on the floor. Frequently, tanks that appear to have walls 6-in. thick are actually made of sheet iron, the thickness of the wall being entirely composed of wasted painting material. In the past few days I have seen one of our machines that has been running steadily for a year and a half. The attendant was as clean as any factory man. The floor was clean. The only evidence of japan was on the articles that were taken at short intervals from the machine. . . ."

Something to think about, isn't it?

K. H. Rohr

Reduced From 10"x14" Clear Crystal Lacquer Panel

IMPROVED
CRYSTAL
LACQUER

For a Beautiful Finish on: Wood, Metal, Celluloid, Paper, Composition, Glass

Write for finishing procedure

H. V. WALKER CO.

Elizabeth New Jersey

(Continued from page 4)

bakes hard in ten minutes at 225°F. and can be packed immediately thereafter; when dipped it drains off free from any fat edges or silking; leaves no wrinkling after baking; gives a hard porcelain-like appearance and is practically mar-proof."

Will you give us the name of the manufacturer of this toy dipping enamel? If it will prove to be as described we certainly will be interested in it.—M. Bros. (Maple, Beech and Birch Flooring).

---

2) In the January issue of INDUSTRIAL FINISHING, under the title, "Developments During 1932" (page 7) mention is made of a "Toy Dipping Enamel." Will you kindly advise me the name of the manufacturer of this material?—A. J. L.

Silver and Gold Paste

1) In the January issue of INDUSTRIAL FINISHING, under the title "Developments During 1932" on page 42, mention is made of Puritan Silver and Gold Pastes. We would like to know the name of the manufacturer of these pastes. We may be able to use some of these products.—Z. Pedestal Co. (Novelty Furniture)

---

2) Will you kindly send us the name of the manufacturer of the Puritan Silver and Gold Pastes mentioned on page 42 in January issue of INDUSTRIAL FINISHING.—L. S. Corp. (Lacquers)

---

3) On page 42 in January issue of INDUSTRIAL FINISHING mention is made of a Puritan Silver Paste. We are very much interested in obtaining an aluminum paste that will give a very brilliant finish, therefore, will you please advise the manufacturers of this product to get in touch with us, or give us their name and we will write them direct.—K-E. Co. (Lacquers and Varnishes)

Non-Grain-Raising Stain

In the September issue of INDUSTRIAL FINISHING you had an article about "Mahogany Finish" by Garrett F. Huizenga (page 22). In this article he speaks of a new non-grain-raising stain. We have tried several such stains on Philippine mahogany and all of them have raised the grain almost as badly as the water stain. We are extremely anxious to get a non-grain-raising stain that we can use on our partitions and doors. We are now using a water stain, as this is the only one that is practical with us so far, but it costs too much

to finish with this water stain under present conditions. We are one of the largest plants on the Pacific Coast doing this class of work.

Would it be possible for you to give us the address of Mr. Garrett F. Huizenga, so that we could write him direct regarding this stain, or could you give us the names of some firms who have found this non-grain-raising stain to be practical on Philippine mahogany lumber, which is of a soft, spongy nature, and the grain raises very much on same.—P. M. Co. (Millwork, Bank Fixtures.)

Automatic Metal Cleaning

Will you kindly give us some information as to the type of equipment in use and the general practice for cleaning large metal stampings in the production of automobile trunks? It has been our thought that a burning-off oven might be the better cleaning practice, but we know of several trunk makers who are using a washing machine. Any suggestions or data you would give us regarding this practice would be appreciated. —T. B. Mfg. Co. (Trunk Racks for Autos.)

Phosphorescent Lacquer

We have read in the Dutch papers that in the U. S. A. the industry is manufacturing a phosphorescing kind of lacquer with which a car can be painted (a line only) in order that it is visible from far away. Do you know the manufacturer of this lacquer, and could you bring us in touch with same?—Van S. & Co., Amsterdam, Holland.

Refrigerator Finish

In the January issue of INDUSTRIAL FINISHING magazine there is an article appearing on pages 9 and 10 in regard to finishing electric refrigerators. I have several to refinish; one is already finished but the customer complains of the fumes from the lacquer used. I would like to get in touch with the manufacturers of these new finishes.—H. E. C. (Auto Paint & Body Shop.)

To Stain Imported Fiber

We're interested in the manufacture of stains for wood and the process of application. We're not interested so much in this for use in applying the stain to wood, as we are staining fibers of foreign importation

(Continued on page 41)

PERMACEL
PAPER MASKING TAPE

To meet a preference of the automobile finishing trade for paper masking tape, PERMACEL enables remarkable speed and accuracy in applying. It is highly resistant to paints and lacquers. Taking a curve so readily, adhering uniformly in *all weather*, PERMACEL produces an unmatched razor-sharp edge, leaving no residue on any metal or wood surface.

JONFLEX
CLOTH MASKING TAPE

Its fine weave insures maximum flexibility. Nearly a half century of experience in adhesives, is your assurance that JONFLEX will hold uniformly and pull-off absolutely clean, leaving no trace of lint or fuzz. Use JONFLEX for color separations, anywhere that the spraying of paints and lacquers is done. Try it on your very next job.

INDUSTRIAL
CLOTH TAPE

Distinguished by slightly heavier texture and stiffer body, INDUSTRIAL tape is particularly suitable in spraying larger surfaces. It produces a keen edge and leaves the surface free of lint and fuzz. INDUSTRIAL tape is resistant to paints, lacquers and solvents, and like PERMACEL and JONFLEX, may be re-used with perfect safety.

REVOLITE tapes are supplied in widths from ¼" to 36" in 60 yard rolls.

WRITE FOR FREE SAMPLE ROLLS FOR COMPARATIVE TEST

THE REVOLITE CORP.
A Subsidiary of Johnson & Johnson
NEW BRUNSWICK NEW JERSEY

REVOLITE

DON'T ASK A BOY TO DO A MAN'S JOB

. . . and don't ask unsuitable equipment to function profitably this year. Your spray-finishing equipment is vitally important. Is it modern? Does it include all the latest money-saving features? Is it specialized for your particular needs, as it should be? Can you depend upon it for economy, speed and perfect finish?

Get the answers from your local DeVilbiss representative. He is at home in the finishing room and familiar with all up-to-date methods. His advice and help are yours with no obligation, and he will gladly consult with you on your spray-finishing operations. Send for him. Or write.

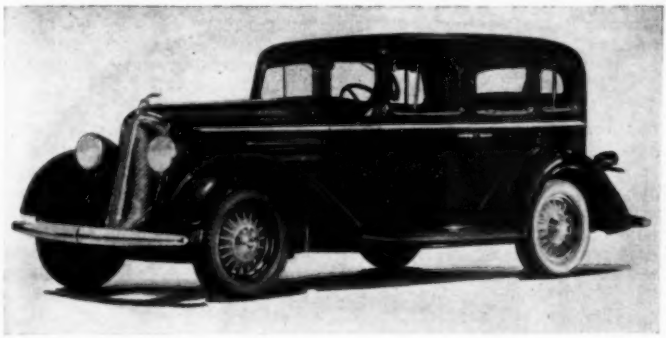
DeVilbiss

THE DEVILBISS COMPANY
TOLEDO, OHIO

New York . Philadelphia . Cleveland . Detroit
Chicago . St. Louis . Los Angeles
San Francisco . Windsor, Ontario

Direct sales and service representatives available everywhere

Try the new DeVilbiss Pro-Tek on your hands. Paint, lacquer, enamel and similar stubborn materials will wash off under running water. Send for free sample.



The 1933 Automobiles

Highlights of the Latest in Designs and Finishes Exhibited at N. Y. Show

by G. D. Hirst

BRILLIANT engineering skill and consummate artistry characterize the new models shown at the 1933 Automobile Show at the Grand Central Palace, New York, which opened January 7th.

The automobile show is one big seductive appeal to owners whose cars are junking at a high rate and who have the wherewithal to buy new ones; and once necessity starts the initial buying, the effect radiates outward making itself felt throughout the whole complex field of industry and trade. The car makers are trying hard to start the ball a-rolling. Never in the writer's experience has there been a more striking exhibition of automobile artistry and ingenuity.

In silhouette, the new cars approach the ideal wind-streaming shape of the rain-drop. Corners are eliminated. The wind stream flows from the base of the radiator over the hood, windshield, roof, back and rear deck, in one line unbroken by angles. Bodies are lowered. Radical slants characterize radiator shields, windshields and rears. Fenders are

Several characteristics of the modern trend in motor car design are revealed in the Oldsmobile 8 illustrated above; for example, sloping V-shaped radiator grille; radiator shell, head lamps (except rims) and running board (except mat) in body color; skirted fenders, torpedo louvres in hood, large bullet tail lights mounted inconspicuously on rear fenders, single-bar chromiumed bumpers front and rear, beaver-tail rear at body covering gas tank, and pressed-metal web-spoke wheels in color.

carried down in apron fashion, bringing them on line with the running board and completely hiding the chassis.

It is futile to consider standard colors because nearly every manufacturer will meet the buyer's wishes as to color, in some instances for an extra charge of only $10. In the cars shown, black is the favorite. Tan seems more popular than last year. Some gray-green and green iridescent mother-of-pearl finishes are seen. Soft deep shades of blue, green and maroon are popular.

In spite of the somewhat garish colors seen in some automobile advertisements, the preponderance of colors are deep and soft. With non-corrodible chromium and deep lustrous pyroxylin lacquer finishes, the cars make a resplendent sight. Some orders for Spring delivery call for two-tone combinations of high luster, bright moulding stripes and vivid colors for wheels. Conservative colors are in the large majority.

The cars seem longer due the use of body color instead of chromium for the radiator shells. The new fender aprons increase the effect of size and weight, although this writer is dubious about their practicability. Anyone driving a car particularly in cities realizes that fenders are made to be dented and the increased surface now available for bumping presages plenty of hammering and refinishing for the service station or wayside paint-shop.

There are the usual claims for mechanical improvements such as improved ventilation, engine cushioning, smoother power, etc.

The writer viewed hundreds of cars, but to pick any one out for individual comment seems unnecessary in the face of the general observations given above. It does seem that at least one manufacturer heretofore known for his revolutionary changes in design and finish has held an ace in the hole, and that later in the Spring some new ideas will greet the automobile world.

I think the general verdict of disinterested observers is to the effect that the 1933 show really has more artistic interest than previous shows. Prices seem extraordinarily low in relation to what is offered. It remains to be seen how the public responds.

Stainless Clad Steel

The Ingersoll Steel and Disc Co. (a division of Borg-Warner Corporation), 310 South Michigan Ave., Chicago, Ill., has issued a folder describing the composition, method of manufacture and fabrication of Ingersoll Stainless Clad Steel, as well as illustrating and listing many applications for this new low-cost corrosion-resisting material.

More Air Conditioning

The day is not far off when most homes will be mechanically equipped so as to provide cool or warm air at the home owner's option, according to R. E. Backstrom, insulation engineer of the National Committee on Wood Utilization of the Department of Commerce.

"Undoubtedly, the subject of air-conditioning is more and more drawing the attention of the American people, and this no doubt is due in large measure to the possibility of its wide application in practically all types of construction."

Air-conditioning already is being widely employed in all types of office buildings, and the next step will be towards applying it to the homes of the country. Not only is this new development suitable for new homes, but progress also has been made to the extent that old dwellings can be readily equipped to provide comfortable air temperatures.

Going hand-in-hand with air-conditioning is the development of house insulation materials, Backstrom points out. Insulating materials, when properly applied to the walls and roof of the dwelling, are essential factors in the success and economy of air-conditioning.

Furniture Show Finishes

by R. G. Meade

Striking Features:

Century of Progress special — a breakfast room suite in checkerboard pattern; black and gray-filled oak squares, with aluminum dividers.

Twentieth Century finish — an oak bedroom suite . . . . quarter-sawed veneer, stained red and filled white . . . . a warm undertone, aspen overlays, solid carvings picked out in gold; lacquered and waxed.

* * *

Walnut is being crowded for first place by mahogany and oak in the dining room, and by maple in the bedroom and in the living room.

* * *

Some walnut appears in grayish tones and some in light shades approaching the former French walnut. Mahogany is brown. Oak is very dark, with raised carvings only slightly highlighted, if at all. A dull luster characterizes most of the finishes.

DOES IT REQUIRE adversity to simplify our tastes in furniture design, finish and decoration? Will conservatism follow sober thinking and more careful spending? If you think otherwise you should have been present (if you were not) at the Mid-Winter Furniture Exhibit in the Mart on Lake Shore Drive, Chicago, in the not-so-boom year of nineteen hundred thirty-three.

Of the jazz era, with its riotous co-mingling of unrelated woods and colorings, excessive ornamentation and bizarre design, but little remains, and that sticks out even more prominently than the proverbial sore thumb. They would almost be worth while as a speculation in curiosities, for some day such as they will be even as the gimcrack hat racks of the World's Fair of 1893 are today. Try and find one of these now!

And speaking of World's Fairs, it was probably inevitable that at least one space would show a "Century of Progress" special. It was a breakfast room suite, modernistic as to design, large checkerboard finish pattern in black enamel and gray-filled oak, with aluminum painted dividers, striping and edges. Not bad looking and an excellent souvenir of a courageous civic enterprise.

The Moderne Revival

All of which brings us by easy stages to a contemplation of the fact that this exhibit has as its outstanding feature the return of Modernistic design—not the premature burlesque of a few years back, the greedy attempt to capitalize a new idea that killed it in one season, but the true flowering of the simplicity and cleanness of practical Moderne as conceived by its originators.

Every space does not show a modern suite or piece, but those that do unquestionably have found

what has long been predicted, that pure Moderne is as logical an expression of the skyscraper age as the skyscrapers themselves. And because it is an interpretation of present civilization and art, it survived even the deadly treatment accorded it on its first appearance a few years back.

The revived modernistic is seen chiefly in bedroom suites, where it is probably strongest; also in novelty, porch furniture and breakfast room suites. Very little is seen in living room furniture, dining room suites, kitchen furniture or cedar chests. In woods, walnut is steadily giving ground to the onslaughts of mahogany and oak in dining room furniture, and maple in bedroom and living room furniture.

Bedroom Furniture

While walnut continues to lead in the bedroom field, maple, as has been said, is crowding very much to the fore, not only in the conventional Colonial and four-poster expressions, but in the modern designs as well. Jenny Lind or spool beds have apparently run their course, for the present at least, as have sleigh or gondola styles.

The trend in colors is toward a grayish or colder tone for walnut with some preference in the Moderne designs for the very light shade formerly known as French walnut. Maple, particularly in the modernistic styles runs decidedly lighter with a distinct saffron or sulphur hue as opposed to the amber or honey shade still employed on the more conventional designs.

Mahogany is seen in almost straight brown, not so much deep in color as distinguished by absence of red. Some renewed interest was shown in enamel suites; one of Empire design in particular, was finished in light ivory with raised decorations gilded and given a brown antique wipe. Another Empire suite showed a two-tone effect of ivory and pale green, with a gold stripe to divide the colors and medallion decalcomanias.

Decoration features two tones of maple on modern designs; also chromium hardware, aluminum stripes and bands and black borders and edges. Two-tone effects are also popular in walnut, particularly in diamond-match pencil stripe veneers, and combinations of Oriental walnut, Circassian walnut and gray curly maple.

One notable bedroom suite in oak was given a "Twentieth Century finish." The veneer is quarter-sawed to give a fine needle point pore, the whole being stained red and filled with white filler. The general tone is gray with a warm undertone, the agreeable effect being heightened with aspen overlays and solid carvings on upper drawers picked out in gold. The wearing finish was lacquer and wax.

In a strictly Moderne design the same finish showed up extremely well, as did another suite in satin wood with aspen crotch overlays and redwood burl top drawers, a color combination of yellow, brown and red handsomely blended. Still another suite in gray curly maple with black bands and edges trimmed with aluminum stripes and chromium hardware was noteworthy.

Dining Room Furniture

It is in the dining room field that the eclipse of walnut is most noticeable. While at least one number is shown in this wood,

it is not featured as are oak and mahogany. Such walnut as is seen is of a neutral, rather grayish tone, trimmed in the Oriental veneer with burl, crotch or diamond pencil stripe on cabinet fronts. Shading has entirely disappeared except occasionally for toning purposes, and the luster continues dull rubbed.

Mahogany appears in Duncan Phyffe and Hepplewhite designs, brown as to color and medium dull as to luster. An occasional Old World finish color is seen in the mellow sherry wine tone, but it is not nearly so popular as at the last market. Satinwood overlays on cabinet fronts are shaded to harmonize in color.

Oak is strongly featured in all spaces, a very dark brown as to color, almost black, with much raised carving which is only slightly highlighted, if at all. Cherry burl is usually the cabinet front overlay, strongly shaded to harmonize with the generally sombre color of the whole. The luster of the finish, needless to say, is almost a dead flat.

In the dinette and breakfast room furniture field, conservatism continues to govern with considerable plain maple and walnut in simple Colonial or peasant designs. A few outstanding numbers included a bleached mahogany suite in Moderne design, free of all decoration or two toning, a trestle-table peasant number stained a yellow brown with gray filler and finished in flat lacquer, as well as the Century of Progress special previously described.

Living Room and Novelty

In the upholstered lines greater prominence is now given to the frame which for some time has been entirely invisible, only feet or arm ends showing. Not only is this true of the Colonial maple numbers stained an amber color and waxed, but in the mahogany, oak and walnut numbers as well, where the colors run rather on the dark side.

More carving is also in evidence; upholstery fabrics are conservative as to pattern and coloring, and Moderne is in evidence chiefly in an occasional chair. White leather with black or silver piping and a chromium tubular frame would be a typical example.

The first Moderne knee-hole desk this writer has seen at a Chicago Show was of natural birdseye maple sides, black enamel top and aluminum painted trim. This combination is popular throughout the novelty lines of tables, humidors and the like, the maple sometimes being stained gray. Two tones of walnut were also widely used in diamond or burl matched veneers and with black edges. Several tables were outstanding, among them being one in oyster white paint with brownish black antique wiping in the carvings; another with reddish oak carved frame and zebra wood top, the latter in Moderne design.

Among the cedar chests, an evident hesitation in experimenting further as to design or finish was noticeable. Carved walnut dominates with diamond matched veneers, cherry burl overlays and an absence of shading. Oak in dark tones was featured for "treasure chest" numbers, and maple was shown in a single Moderne design, stained gray and with the familiar black edge and aluminum stripes.

Porch and Kitchen Furniture

Porch furniture has again resorted to bright colors beautifully

harmonized in rainbow effects and three-color patterns in reed brown, tan and red, yellow, green and black. Shading seems definitely out of the picture and Moderne designs, now less popular in this field, are considerably modified. They are expressed in chromium tubular frames with black, orange and black, yellow and green upholstery and paint.

Kitchen cabinets have also grown more conservative, several showing the modern influence in white enamel with black edges, stripes and stencil designs. Others, in oak, show the ever popular light green stain with dark green pores and edges with small black or brown stencil patterns. There is some shading, but two-toning seems to be preferred.

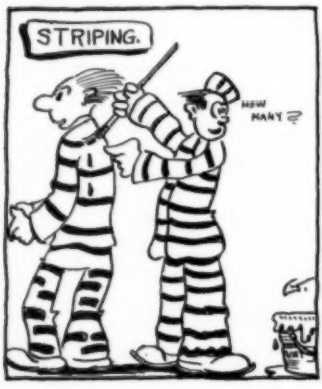
Rock Hard Water Putty

Referring to R. F. Co's. inquiry under the above title, page 43, Dec. issue, if the inquirer cannot find where to obtain a supply of "Rock Hard" he might try making up his own material. This is a preparation in dry powder form which has been on the market for years. It is used for filling checks, cracks and holes in wood trim, etc. It is used also for filling cracks in both old and new floors. It is very easy to make and to use, and when thoroughly dry will not have any tendency to shrink or crack. The composition is:

Quartz Silica.....(by wt.)	10 parts
Plaster of Paris.....	2 parts
Dextrine	1½ parts

The quartz silica is the same kind of silica as is used in the so-called "silex" paste wood fillers for furniture finishing. In this mixture dextrine is the binder (pulverized gum arabic could be substituted for greater hardness); dextrine is the cheaper material now almost universally used for adhesives.

Make a thick plastic paste of the above with water; and previous to applying, the surface ought to be slightly moistened to assure best results. Further or more detailed directions need not be stated because this would be handled in the same manner as the inquirer had been accustomed to use the rock hard putty. The ingredients could be readily procured locally at low cost. A reasonable quantity of the stuff could be mixed up at a time for stock—so long as it is kept in a dry atmosphere to prevent deterioration of the Plaster of Paris.—E. PERRY.



Hilo Sales Conference

The western sales representatives of the Hilo Varnish Corporation held their Annual Round Table Sales Conference at the company's Chicago office, 2420 Washburne Ave., during the week of January 9th.

Plans for increased sales and greater customer-service were presented by E. J. Cole, Secretary, and were received with enthusiasm. The program aims to provide the salesmen with close contact with developments at headquarters and to increase salesman efficiency and help to the customers.

Black Finish on Metal Chemically

by C. F. Scribner

Industrial Engineer

"In spite of the growing interest in color, as an element of sales appeal, there is still a large field for black as a metal finish for many articles.

"I have been looking through my files and have just come across the enclosed which is based upon the practice of a number of firms where extensive use is made of black finishes, which must combine beauty with durability?"

COLOR, as varied in product as in nature, is receiving increasing attention from every manufacturer whose product in any way lends itself to such sales appeal. Yet, because "It is almost as easy to blacken a man's character as to whitewash it," there is still a field for durable black finishes. Some of these black finishes which have stood the acid test of experience are given in the following:

On Copper, Brass or Bronze

Dissolve ½-lb. caustic soda flakes in 2-qts. of cold water; heat to the boiling point; add 1-lb. powdered white arsenic and boil until the arsenic is completely dissolved, then allow to cool. In 2-qts. of water contained in another vessel dissolve ¾-oz. of C.P. cyanide of sodium; then mix the two solutions and stir. Use with electric current in plating bath, with anodes of wrought iron and current densities similar to those employed with double sulphate nickel baths. The finish will vary with the luster of the base metal, bright surfaces finishing with a higher luster than dull surfaces.

Steel Grey on Brass

A satisfactory finish for electric fixtures, radio parts, typewriter parts, etc: Dissolve 2½-lbs. caustic soda sticks in 1-gal. water, add 6½-lbs. white arsenic, and boil until the arsenic is completely dissolved; then add sufficient water to make 10-gals., and allow to cool. Arrange plating bath as ordinarily and use rough brass anodes, with from 2 to 3 volts. With solution at room temperature, a plating time of from 15 to 30 minutes will give a good deposit. A lustrous finish is produced by scratch brushing with a nickel-silver wire brush, then applying a good grade of transparent lacquer.

Carbon Black on Iron or Steel

Immerse the articles in a mixture of equal parts of lard oil, boiled linseed oil and machine oil, then burn off the oil with a mild flame. This operation requires to be repeated if a permanent dull black is desired. Articles should be highly polished before receiving this treatment if the best possible effect is wanted.

Black Lacquering Brass and Steel

Lacquer finishes are both durable and modern and are superior to many oxidized finishes. For dull black or glossy effects, lacquer affords an excellent medium. As in all finishes, the life of black lacquer depends very much on the preparation of the surfaces before application of the lacquer coat.

To obtain great wear and durability, it is essential that the metal should first be cleaned, then oxidized, using any oxidizing process which will create a black surface. Brass can be oxidized with the use of a black nickel solution, or with the ammonia copper dip, the resulting oxide making a satisfactory base upon which to apply the black lacquer.

Sulphurette of potassium will oxidize copper, bronze, copper-plated steel, lead, zinc, or any other metal that can be copper plated. This is a popular oxidizing solution and its cost is low. Black lacquer applied over it will create a most durable and lasting finish.

It is usual, when applied to desk telephone and other office equipment, electrical appliances and instrument work, to prepare brass with a black metallic oxide applied with heat. When finished with black lacquer they can be handled many times daily without affecting the lacquer finish in the least. Where black japan or enamel is used for such work, it is usually unsatisfactory, as these do not adhere properly to brass.

Brass is preferred to steel for such parts on account of the tendency of steel to rusting, but it has always been a problem to get a black finish that will stand on brass goods. Where the black is obtained with heat, and where this black is protected with "rubber finish lacquer," it cannot be excelled as a permanent and durable black finish.

While this extra step increases slightly the cost, yet the finish obtained and the wearing qualities will amply repay the little extra work and expense. In this connection, the following is being successfully used in several plants: First, sand blast. Next, put the work on a hot plate, which can be made by laying a piece of sheet metal over a gas flame. When the parts are warm apply a saturated solution of nitrate of copper and water. Now, make up a saturated solution of nitrate of silver and water and have available.

Taking two parts of the copper solution and one part of the silver solution, dilute with two times its volume of water and apply to the brass. Then burn the parts on the hot plate. When applied the solution will be green, turning to brown and finally to black. As soon as the surface turns black, remove from the hot plate and brush. The metal then has a metallic black surface, which has been burned into it. After cooling, hang it in a sulphurette of potassium solution for about five minutes.

The treated articles can then be dried, and are ready for the black lacquer which may be applied by any convenient method. Through this preliminary treatment the use

of black lacquer finishes have become popular because of their beauty and durability, especially as a contrast to the finished woodwork with which they harmonize.

Silver and Red for Decorative Effects

ONE OF THE modern decorative schemes that is popular in New York City at present is a silvery finish, often combined with black or black and red. The silvery finish is used on walls and ceilings, in furniture of all types, in small accessories that are so important in modern rooms, in dining room table settings and in the china service, in vases and lamps, in upholstery finishes. In fact, this new color scheme is legion in its contemporary design uses. Some of the newest offices have much of it; in one, the decorator covered both walls and ceiling with silver leaf, and tempered the usual metallic brightness with a blue glaze. This same decorative effect has been used in private homes also. It is a smart effect and also a restful one.

Screens are being used more in interior decoration, and on these there is much of the silver and black decoration—often with a small amount of red in borders or at other points.

The reds used include lacquer red, coral red, tomato red, Chinese red. Since red is such an effective color for finishes of many types, great care must be exercised in the choice of the particular red to be employed. One finds this noticeable when studying the different reds to be seen in the best museums, in all decorative lines, as well as in the best paintings.

One of the leading decorators in screen work has recently displayed screens in an adaptation of the ancient Italian gesso method; in addition to oil colors he applies thin sheets of silver and burnishes them so as to give various degrees of hue from silvery to dark tones.

With walnut there is no color equal to the right shades of blue. With black woods, silver or red can be used effectively.—B. CALDWELL.

A new slide rule makes it easy to match new colors to old painted surfaces.

Extra tough, flexible, durable, lustrous, air-drying finishes for metal are now available.

Ault & Wiborg Varnish Works

An announcement from The Ault & Wiborg Varnish Works, Inc., Cincinnati, Ohio, states that at a recent meeting of the Board of Directors, some changes were made in the list of officers, and the list is now as follows:

Mr. Joseph R. Esposito continues as President, and Mr. C. R. Bragdon, as Secretary. Mr. H. A. Dunne has been elected Treasurer, and Mr. W. W. Wright, Assistant Secretary and Assistant Treasurer.

These four officers will make their headquarters at the company office at 75 Varick St., New York, thus involving a removal for Mr. Bragdon who has, for 18 years, been closely associated with the technical work of the factory at Cincinnati, as the active head, and later, as consultant.

Mr. Mark W. Frishkorn, who has been Director of Metal Lithographic Products of the company, becomes Vice President as well. Mr. E. W. McMullen, becomes Vice President and Plant Manager, retaining also, his duties as Technical Director. Both of these men will be located at the Cincinnati factory.

The company suffered on January 16, the loss by death of its Comptroller, Mr. William T. Croake, who had served it faithfully for ten years; Mr. Henry F. Hudson, has been chosen as his successor. Miss H. E. Reinert continues as Cincinnati Office Manager; Mr. John A. Henry becomes Service Manager and Mr. H. B. Bond, Manager of the Technical Service Bureau.

Modern Developments in Wood Finish Materials-I

by M. J. Pearce
The Glidden Company

WOOD FINISHING materials, as used today, are of many varieties and may be classified in many ways—according to composition, color, drying time, use, or other properties. Interest centers primarily in the practical angle of the use of finishing materials on such wooden objects as furniture, store fixtures, radio cabinets, pianos, and other similar commercial articles rather than in the scientific or theoretical angles of composition and chemical reaction connected with the manufacture and behavior of the individual materials.

For the purpose of this paper, therefore, wood-finishing materials will be considered in a general way—first, according to the purpose which they serve, and secondly, according to the type of material. To further clarify the subject, the discussion will be limited to those materials used in producing a transparent or semi-transparent finish, and not solid-covering primers, enamels, and other opaque finishing materials.

Wood-Finishing Stains

In the early days of the furniture and woodworking industry, the natural color of the wood was frequently the only color given to the finish. The early American maple, cherry, and walnut furniture illustrates this point. Mahogany and other well-grained woods gave a pleasing color when finished without stains.

With the advent of large factories that turn out thousands of wooden articles in a year, such large quantities of the more desirable woods have been used that the quality of the color and figure has become less perfect. Furthermore, many species of wood which do not give such beautiful results without the use of stain, such as gum, elm, beech, and birch, have come into general use for such parts as posts and rails, and must therefore be made to closely match the color and figure of the more expensive woods used in other parts of the same article. These factors, together with the decided preference of the buying public for richer and deeper shades than those given naturally by many of the woods, have led to the use of stains.

Early in the use of stain, each operator made his own stain according to a special formula, sometimes inherited. Today few make their stains.

All stains may be divided into two general classes—powder stains and liquid stains. The pow-

First installment of paper read at the meeting of the Wood Industries Division of the A.S.M.E. at Jamestown, N. Y., Nov. 15 and 16, 1932.

der stains are called water-soluble, spirit-soluble, or oil-soluble, according to the liquid in which they are dissolved. Liquid stains are divided into acid stains, spirit stains, penetrating oil stains, pigment oil stains, chemical stains, and non-grain-raising stains.

Powder Stains

Powder stains, or stain powders, are the dry coloring matter which gives color to stains. Many are dyes made from intermediates manufactured from benzol, naphthalene, anthracene, and other coal-tar derivatives. Two or more intermediates must be mixed to produce a dye. Each color is a definite chemical compound with characteristic properties. Some are soluble in water, some in alcohol, and some in benzol, toluol, solvent naphtha, turpentine, lacquer solvent, and other so-called oils. Some are fast to light, while others fade easily. Mixtures usually are necessary to obtain a range of shades. Since not all of the colors can be used together safely, it is necessary to know their characteristics. Only experts in the blending of the powders can insure uniformity.

Water-Soluble

Of the powder stains, the water-soluble ones are the best and the most widely used. They are aniline dyes derived from coal-tar by-products. Sometimes they are incorrectly called "acid stains" because in the textile industry the colors frequently are mixed with acid materials. In the wood-staining industry, acid is seldom added to stains, and when used it is very weak.

There is no doubt of the merits of water-soluble aniline stains for all fine work. They are fast to light and permanent in color, while oil-soluble and spirit-soluble stains soon fade upon exposure to sunlight. Furthermore, water stains produce more uniform tones, and thus aid in bringing out the beauty of the wood. The water stains are inexpensive, since 4 to 8-oz. of powder to a gallon of water produces most of the popular shades.

The chief drawback of water stains is that they raise the grain and loose fibers of the wood, producing a rough surface, which must be sanded again before finishing. To aid the sanding it is customary to apply a wash coat of shellac made by adding eight to ten parts of denatured alcohol to one part of a 4-lb. cut shellac, after the stain has dried. This stiffens the fibers and allows the sandpaper to easily cut them off smooth. The water in a water stain has a natural affinity for the fibers of the wood, and from 24 to 48 hours should be allowed after staining the work, before the next finishing operation in order to let this excess moisture evaporate.

Water stains are therefore not well suited to fast production schedules. Despite the low initial cost of water stains, they are expensive to use, when all of the costs in connection with a given finish are considered.

Spirit-Soluble

Spirit-soluble powders, as a rule, are aniline colors. They are generally conceded to be the least fast to light of all stains, but where extra-quick drying is desired, they are the logical stains to use, especially if not exposed to strong light. Formerly, they were used quite extensively for blending, matching, and unifying

the figure or color of one piece of wood to that of another piece in the same article.

Spirit stains always contain some water, and therefore raise the grain of the wood to some extent, and for this reason and also because of their extreme sensitiveness to light, they are rarely used for finishing furniture, other than in overtoning or color patching to even up the color of the work.

Oil-Soluble

Oil-soluble powders are usually aniline dyes and are more frequently purchased in the liquid form than are water stains or spirit stains. From the standpoint of fastness to light, oil stains are somewhat better than spirit stains, but they are not nearly so permanent as water stains. The red, orange, and yellow shades of oil stains are especially fugitive to light. Oil stains do not raise the grain of the wood and for this reason have received much consideration.

Oil stains are quite penetrating, and consequently do not produce so uniform a color tone as water stains. The oil stain penetrates the soft portions of the wood and gives a much darker color here than over the harder spots.

Oil stains are partially soluble in alcohol and are wholly soluble in most of the solvents used in the manufacture of varnish and lacquer. This causes an oil stain to "bleed," or to become partially dissolved, in succeeding coats of finishing materials applied over it. This bleeding tendency frequently spoils the work, not only from the color-change standpoint, but also because any appreciable quantity of oil stain in the succeeding coat of varnish or lacquer will interfere with the drying of that coat and result in a brittle or "rotten" finish.

This slow-drying and "rottening" effect of oil stains is intensified by the fact that many of the colors are precipitated on a stearic-acid base at the time of manufacture. This stearic acid and other constituents of oil stains interferes with the adhesion and drying of nitrocellulose lacquer, and in some cases goes so far as to precipitate the nitrocellulose in the lacquer, which in turn causes a decided blushing of the lacquer. For these reasons, oil stains, except certain special shades recommended by stain manufacturers, should never be used under lacquers, and they should not be used under varnishes where best results are desired.

Liquid Stains

Liquid stains are made from powders dissolved in the proper liquids, although materials other than powder colors, such as dry pigments and asphaltum, are frequently added to liquid stains. So-called liquid acid stains are little more than water solutions of water-soluble powders to which small quantities of other materials are sometimes added. Spirit liquid stains are usually solutions of spirit-soluble powders. Penetrating liquid oil stains consist essentially of a solution of oil-soluble powders.

Pigment Oil

Pigment oil stains are never shipped in the powder form and are so-called "surface stains," in that they do not penetrate deeply into the fibers of the wood. Pigment oil stains are made from dry pigment colors such as umbers,

STERLING VALUE

SILVER LACQUER #714

SILVER LACQUER #714 produces an excellent gloss, provides maximum adhesion, may be either dipped or sprayed, and engraves perfectly.

It has been consistently used for years by many of the country's leading silverware manufacturers and stands alone as a quality product that can always be depended upon.

The extensive facilities of our service laboratory are at your disposal without cost.

"The Standard of Quality Since 1884"

THE ZAPON COMPANY

A Subsidiary of Atlas Powder Company

Stamford ZAPON **Connecticut**

siennas, Van Dyke brown, and rose pink. They are usually mixed with drier, turpentine, naphtha, linseed oil, asphaltum and similar liquids which serve as a suspending medium until the stain is applied, and as a binding medium for the pigment particles after the stain is dry.

Pigment oil stains are applied by spraying or dipping, on chairs and cabinet work of the less expensive and less beautifully figured woods. They are inexpensive, fairly permanent in color, do not raise the grain of the wood and, because of the tendency to hide the figure of the wood slightly, they give quite uniform tones, which, however, are not as clear as the colors produced with the other stains. To even up the color tones still further and reduce the tendency of the stain to hide the grain of the wood too much, pigment stains are usually wiped with a dry cloth shortly after being applied.

Chemical

Chemical stains are liquid stains that depend upon a chemical reaction to produce the color effect. Some of the more common materials are permanganate of potash, iron acetate, tannic acid, and picric acid. These stains require such careful handling that they are seldom used where time is an important factor.

Perhaps the best example of the use of chemical stains is the imitation fumed oak formerly produced with ammonia fumes in an airtight chamber. The modern method is to apply a water solution of tannic acid, which does not materially change the color of the wood, but does even up the quantity of tannic acid in the wood, so that when another chemical solution is applied, the reaction between the tannic acid in the wood and the chemical in the stain produces a fairly uniform fumed-oak color.

Non-Grain-Raising Stains

From the foregoing discussion it will be seen that an ideal stain would be one having the permanency, uniform color tone, and non-bleeding properties of a water stain, coupled with the non-grain-raising and quick-evaporating properties of an oil stain. In other words, if the good qualities of a water stain and the good qualities of an oil stain could be combined, a new stain would be produced which would be fast, durable, and beautiful. After much development work, the modern so-called non-grain-raising stains were produced. This type of stain varies greatly, depending upon the manufacturer, but all have the same general aim—to prevent raising the grain of the wood, coupled with fast drying and permanence of color.

While non-grain-raising stains are perhaps not quite as fast to light nor of as uniform staining properties as water stains, they are satisfactory for all practical purposes. Because of the cost of the solvent, non-grain-raising stains have a higher initial cost than water stains. The saving in time, labor, and material, due to the elimination of the wash coat of shellac and the sanding operation, often compensate for the slight increased cost of the stain itself, however, and many woodworking companies have found non-grain-raising stains adaptable to their needs. Because of the fast evaporating nature of the solvent, the next finishing operation after the staining operation can proceed

within 30 minutes to an hour, although it is wise to allow more time than this.

These non-grain-raising stains may be used under shellac, lacquer, or varnish. It is not necessary to apply a coat of shellac over the stain before varnish or lacquer is applied, as the non-grain-raising stains are non-bleeding. Another advantage is that the color of the stain is not picked up when paste wood filler is applied directly over the stain.

Other Miscellaneous Stains

Uniforming stains, glazing stains, shading stains, and other special stains are often used, either by themselves or with the other stains heretofore discussed. Uniforming stains are intended to unify the color of sap streaks and other defects in veneer, or for matching the color of one type of wood to that of another type. Glazing stains or overtoning stains are frequently little more than pigmented oil stains, which are applied over other colors and wiped off to produce a glazed effect. Shading stains of the best quality are made on a lacquer base and, by spraying lightly on parts of the work, they produce a darker color. The shading stains are usually applied after one or more coats of finishing material, but before the final coat. They are used more often with lacquer finishes than with varnish finishes.

(To be continued)

Chadwick L. Rowe . . . .

Mr. Chadwick L. Rowe, formerly president of the Denny, Hilborn & Rosenbach Co., of Philadelphia, Pa., is now president of the Rowe Paint Co., located at 43-42 Tenth Street, Long Island City, N. Y.

Mr. Rowe, in the announcement to his many friends in the industrial field, states that his organization is composed of men, who like himself, have had a score or more years experience in the development and application of industrial finishes. The announcement also states that they manufacture a complete line of industrial finishes.

Despatch Oven Personnel

A letter from the Despatch Oven Co., 622 Ninth St. S. E., Minneapolis, Minn., reports the following recent changes in its engineering and selling personnel:

Mr. K. J. Papke, 1012 N. 3rd St., Milwaukee, Wis., has been appointed district engineer in charge of sales in the Milwaukee territory.

Mr. E. C. Buehrer, 669 Howard St., San Francisco, Calif., has been appointed district engineer in charge of sales in the Northern California territory.

Mr. W. Glen Tipton of the Equipment Engineering Co., 210 S. Penna. St., Indianapolis, Ind., has been appointed district engineer in charge of sales in the Indianapolis territory covering central Indiana.

W. F. Hebard & Co., 551 W. Van Buren St., Chicago, Ill., has been appointed district engineer in charge of sales in the Chicago territory covering northern Illinois and the northwest section of Indiana.

These men are especially equipped with information and data pertaining to japanning and enameling ovens, core ovens, coil and armature ovens, special driers for all purposes and continuous type driers and baking ovens.

Selection of Colors - II

by Howard Ketcham

Director, Duco Color Advisory Service

COLOR MATCHING can be accurately accomplished by placing a 2½-in. disc of a desired color in the center of the color wheel, Fig. 2, where the

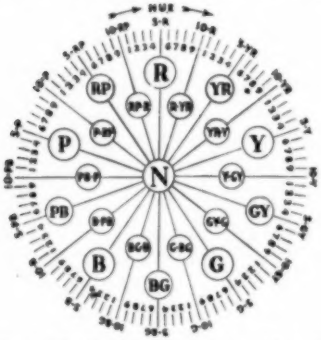


Fig. 1 — The hue circuit to illustrate calibrated colors. B — Blue, G — Green, P — Purple, R — Red, Y — Yellow. Courtesy, Munsel Color Co.

circle marked "Neutral 3" appears in that illustration. By using discs representative of the various color elements and by experimenting with these discs in various proportions, the correct areas of hue, value and chroma can be arranged on the larger circle so that when the wheel is spun the colors will revolve to match the desired standard color represented on the inner circle. In this way, it will be found that equal areas of red, yellow, green, blue and purple at five value and five chroma will revolve to produce a neutral gray at the corresponding five value.

The colored discs illustrated in Fig. 2 are balanced to produce a neutral at 3 value. When two complementary colors, properly balanced as regards value and chroma, are rotated, the result is the same as when wet colors of this type are mixed: A perfect neutral gray is produced. If one of the colors is represented on a larger area of surface than its complement, then resultant gray will partake of the quality of the dominant hue. If blue purple blue predominates in a combination with yellow red yellow, then a bluish gray will result. This wheel also enables us to determine the amount of a bright color to use in combination with a dark color

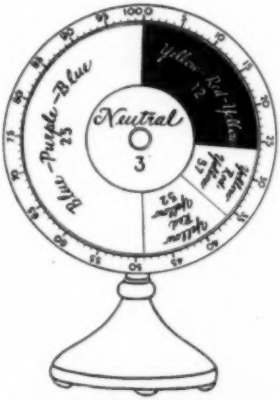


Fig. 2—A rotator disc for reducing proportionately colored areas, as described in article.

ECONOMICAL COVERAGE

BY SPRAY OR DIP

UTILITY Lacquer Enamel is so concentrated that it takes nearly an equal quantity of thinner. And it is low priced to begin with.

Because of long flow, it dips without streaking on long and unusually shaped articles. Sprays without orange peel.

Covers solidly. Adheres to wood or steel. Send for chart of colors with "sales appeal."

Thinners That Cut Quickly

The line includes a thinner for every use. Each is moderately priced. Mention requirements for quotation.

JAMES B. DAY & CO.

1872 CLYBOURN AVE.

CHICAGO

UTILITY

LACQUER ENAMEL

in order to secure perfect color balance.

Units of Proportion

A polar planimeter can be used effectively to determine units of proportion. The number of square feet in the fender area of a car can be learned from a use of this instrument on a scale drawing; the body area of a car can be disclosed in the same way. In this manner, various car areas can be analyzed and appropriate balancing colors determined. Fig. 2 shows a color scheme selected in this way for use on the car in Fig. 3 in the areas designated. When revolved the colors in Fig. 2 will resolve into a Neutral 3 and will consequently match the small circular disc in this value shown in the center of the color wheel in Fig. 2.

The accompanying illustration, Fig. 3, depicting a composite automobile, is submitted to show the respective units of proportion. Suppose, for example, that a planimeter reading of the various areas of a car similar to the one illustrated were recorded as follows:

Burbank top area (8 on Fig. 3), 5 units of proportion.

Window ledge moulding, disc wheels and body sill and wheel house moulding (7, 1, and 4 respectively) represent 1, 3, and 1 units of proportion respectively.

Mouldings, running board splash apron and fenders (6, 3 and 2 respectively) show 2, 1 and 7 units of proportion respectively. Body area (5) shows 20 units of proportion.

We have certain basic facts relative to effective color harmony at our disposal to commence with. We know, for example, that it is desirable to use as few hues as possible in any given combination: That maximum color contrast is achieved through:

1) The use of a color with its complement.

2) The use of a high value color with a low value color.

3) The use of a strong chroma color in combination with a weak chroma color.

4) The use of warm colors with cold colors.

Color Selection

To color the automobile in Fig. 3, making use of our planimeter readings and these color facts, we first determine the principal hue to use. We might read a recent release of the "Automobile Color Index." This study would convince us that purple blue is the most popular hue at the moment. Not wishing to see our car color coming at us from every direction on the road, we determine on a color slightly different from the vogue. Blue purple blue, a neighboring color family to purple blue, may be selected because it is dis-

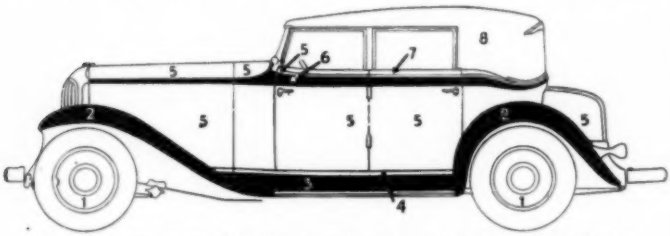


Fig. 3—A composite automobile illustrating the application of modern calibrated colors

tinctive and appeals to our fancy.

We know from Fig. 1 that yellow red yellow is the complement of blue purple blue. Various values and chromas of this secondary hue will fit in splendidly as a secondary accent color without requiring the use of a third hue for this purpose. The Burbank top at yellow red yellow 52, for example, will look exceedingly appropriate and smart. The window ledge moulding in this same hue and value, but at a strong chroma, say yellow red yellow 57, will work out well. This identical color will serve admirably on wheels, body sill and wheel house moulding.

A touch of variety, without the introduction of a third hue can be accomplished through the use of a low value, weak chroma color, yellow red yellow 12, on the mouldings and fenders. A median value yellow red yellow at seven steps of chroma and another median value yellow red yellow at two steps of chroma, together with yellow red yellow 12, all combine in the areas outlined with blue purple blue. The value and chroma of this blue purple blue can be worked out arithmetically, providing tools in the form of calibrated colors are available with which to work.

Using the Rotator Disc

By revolving these four colors on discs on the rotator, Fig.2, we can determine the degree of balance these colors afford by the perfection of the neutral produced when the colors rotate.

The degree of area each color is to occupy on the disc in Fig.2 can be determined by dividing the total of the units of proportion of the combined areas, which is 39, into the total for each area. This tells us that a composite disc made up with a surface area comprised of 51° of blue purple blue 25, 13° of yellow red yellow 52, 10° of yellow red yellow 57, and 26° of yellow red yellow 12, represents a perfect color balance because of the perfect neutral resulting from the blending of these colors on the rotator. The neutral in this instance comes to three value. Car color schemes that balance in No. 3 neutral have been readily salable of late.

The automobile manufacturer who takes time to test his market to uncover consumer color preference and who meets the requirements disclosed by his market analysis with skill and good taste can do much at little cost to strengthen his sales position. Calibrated colors afford every advantage in operating economies by eliminating wasteful color duplication. Calibrated colors stimulate car sales through the greater range, individuality, smart newness and harmony their use affords.

New England Lacquer Co.

A card from F. N. Howard, President of the New England Lacquer Co., Providence, R. I., says:

"We take pleasure in announcing a change in our organization, resulting in the appointment of C. T. Howard as Treasurer. We feel that his connection brings to this company a valuable experience. Our sales and service policies have been arranged to expand our already substantial business, and we enter the new year with confidence."

Wood Colored in Growth

It is reported that a German method of injecting dyes into growing trees results, after about two years, in the coloring going all through the wood. Chemicals are used that have no affinity for one another, so it is possible to circulate different shades and tints through the trees. Some of this colored wood is used in certain furniture exhibited this year at the American Furniture Mart.

How to Ebonize Light-Colored Hardwoods—I

by E. Perry

First installment of a 2-part article which reveals practical methods and formulas for producing imitation ebony from several kinds of light-colored hardwoods

THERE is only one practicable method to completely and therefore satisfactorily impregnate woods with coloring agents; this is by the vacuum process. Any other means resorted to may become useful, depending on such factors as: the species and porosity of the wood to be stained, and of course its thickness to be impregnated; whether water solution would be detrimental to the finished work; or whether the lesser penetratives like aniline dyes or pigmented stains must be used for certain reasons.

The cellular structure of wood naturally lends itself to the process first mentioned, whereby practically all air contained within the fibers can be withdrawn; then permitting free access of the coloring solution to completely permeate and saturate the wood by ingress from the ends—following the natural sap veins of the wood. Obviously, the process is successful with practically any reasonable size and thickness of wood by governing the temperature and vacuum, but principally the length of time of immersion in the solution under pressure.

Vacuum and Pressure Staining

As just inferred, staining and deep impregnation are facilitated by heat, and therefore aqueous solutions are quite generally the rule, for three primary reasons, namely:

1) The economy of water as the dye solvent, which also is safest to use under high steam pressure.

2) Wood tissues have a natural affinity for water, which insures greatest penetration and absorption of the coloring solution.

3) In the main, the water-soluble dyes seem to be more light-resistant than other types of dyes.

The cabinet woods used for marquetry work are partly natural-colored fancy woods, but these are augmented by others stained in various colors. Years ago marquetry was the regular decorative work in all Pullman palace and sleeping cars. Veneers used for this work were 1/32 and 1/16-in. thick, water-stained clear through, possibly by soaking a long time in solutions kept hot by open steam jets within the vessels. It is my recollection that the German patent on vacuum and pres-

sure staining of woods through the end grain was a comparatively recent development, whereas the Pullman Company had been doing this marquetry for several years.

In addition to the vacuum process for impregnating woods, I shall mention some of the simpler means and materials utilized, without requiring expensive equipment which a small production would not justify. In this connection, it is well to reiterate the fact that none of the following procedures can possibly accomplish the same efficient results as ascribed to the vacuum process. The vacuum process stains the wood clear through, so that turnings and deep carvings from solid wood show uniform coloration, as with natural fancy woods. The commendable features of these other methods are the simplicity and the reasonably satisfactory finishes which can be produced economically.

Best Woods to Ebonize

The woods best adapted for ebonizing are apple, pear, hazel, maple, beech, and birch, in the order named. When stained black, they give a good imitation of the natural ebony. Originally, black piano keys were cut from real ebony, but for a long time they have been made of woods that were either artificially stained or solid coated with a pigmented rubber-finish dull-black enamel. The present method for staining and finishing black piano keys is reported by one authority as follows:

"Piano Key" Method-1, Pressure

First, the wood is allowed to soak in water for 15 hours, after which the keys are removed and placed in a vat of dye solution. Here they are kept under a steam pressure of 10-lbs. during 24 hours. The keys are not removed for another 24 hours. In the meantime the solution cools down. This is to prevent checking of the wood in drying. The stained keys should be dried in a kiln, starting with high humidity and gradually lowering same until the wood is dry. After drying, the keys are sanded on a belt sander, finishing with fine paper. Finally, they are polished on a high-speed buffing wheel. Graphite, on a felt or cotton buffer, is employed in the final polishing operation. The resultant finish has the appearance of ebony wood.

In the foregoing system, a steel-cylinder vat is used. However, aqueous solutions of some acid or chemical stains react on steel and other metals to the detriment of the solution or to the tank containing it, therefore wherever practicable the tank should be of wooden construction.

"Piano Key" Method-2, Dipping

Another method for staining piano keys is this: Boil 2-lbs. of logwood chips in one gallon of water; or in place of the logwood chips use 2-oz. of logwood (solid) extract. Immerse the wood in this solution for at least 15 minutes; then drain off and allow to dry in a good circulation of air. Immerse in a second solution consisting of 4-oz. (¼-lb.) of green copperas (sulphate of iron), or of sulphate of copper, to one gallon of water. Similarly, remove and allow to dry in a warm well-lighted place—but the drying should not be hastened by artificial heating. Finally, pass the wood through an alkaline solution made by dissolving ½-lb. of sal soda into one gallon of water. After passing through this third solution, the articles should be rinsed in clear water to clean them thoroughly.

Another Dipping Method

Still another similar method utilizes the following formula: Tie into a cotton cloth ¾-lb. of solid logwood extract, and place this into two gallons of water, which should be allowed to boil until the liquid is reduced 50%. Remove the cloth now containing only a small amount of fibrous inert matter. To the hot solution of logwood, add 2⅔-oz. of powdered sal soda or half the amount (1⅓-oz.) of dried carbonate of soda. Stir this gradually into the hot solution, and remove the resulting foam. The wood may now be dipped into the completed solution. When dry, should the wood show too weak penetration and color, repeat the operation after first reheating the solution. Following this when dried, immerse the wood into a second solution—a hot solution of bichromate of potash or soda, using 6⅔-oz. of the bichromate to one gallon of water. A deep rich color should result, and quite deep penetration.

Ebonizing Hard Maple

The next description applies rather specifically to selected hard maple. Portions of the information to be given have appeared in INDUSTRIAL FINISHING (February and October issues in 1929). The data is: Into one gallon of distilled water, dissolve by boiling, the following:

Permanganate of Potash	12-oz.
Copper Sulphate	4-oz.
Iron Sulphate	4-oz.

Heat this solution to 160°F., and immerse the wood for a few minutes—say 15 minutes; when dry, re-immerse and dry again. There will be a precipitation of the excess chemical salts on the surface when dried, and this must be thoroughly removed by rubbing with a dry cloth, before recoating. Now, into one gallon of distilled water, dissolve 12-oz. of aniline hydrochloride (aniline chloride) which is the salt from combining aniline with hydrochloric acid. Heat this solution to the boiling point; then apply two dip coats as before, each time allowing the wood to dry thoroughly. The ebony black color does not appear at once, but usually develops within a few hours.

(To be continued)

Smooth Surface First

I HAVE READ with pleasure and profit the various articles on wood finishing by tumbling, dipping and spraying. Invariably they are helpful.

A question arises in my mind, to which I attach my own answer. Why do manufacturers apply paint to commercial articles? The first answer probably would be, "to beautify them and add sales appeal." The second, no doubt, would be, "to preserve, protect and add to the durability or life of the article." "To make the item smooth to the touch, easy and pleasant to handle," might rank third.

I feel safe in saying no one will argue that any one of the three is a useless or unnecessary objective. To a great extent the degree attained by all three indicates the quality or utility of manufactured goods, even though the film of paint has nothing to do with the operation of the thing itself.

It is the third, however, that I wish to emphasize. I claim tons of paint are wastefully applied daily to make products look and feel smooth. In the same breath I contend paint should not be applied to make goods smooth. I venture the assertion that gener-

ally it is cheaper to make the raw product as smooth as you wish it to be, and then apply the finish to make it attractive—this in preference to starting with a rough or badly prepared surface, and then applying enough fillers and paint to make it passable.

Frequently the paint itself, or the method of application is blamed for an unsatisfactory finish when the real fault lies in lack of preparation. One coat of paint, applied to a piece of clean, smooth metal or wood, will produce a far superior effect than two coats on the same object if it is rough or lacking in sensible preparation.

I have used the word paint in its broad sense, whether it be stains, filler, shellac, varnish, lacquer, etc. If you feel dissatisfied with the finish on any article you are manufacturing, I suggest you seek the quickest, easiest and most economical way possible to make it smooth enough to market as it is. Then apply your paint only with the object of adding protection and beauty.

Probably, and perhaps to your own surprise, the extra cost of making the surface extra smooth to start with, will be more than overcome in paint, labor, time and overhead saved—and your actual net cost will be less. The fact that there will be fewer complaints, returns and rejects, with far easier marketing, will constitute pure velvet.—RALPH H. HOKE.

Bramley Joins Coatings Corp.

It is announced that Mr. Harold Bramley, who for many years was associated with Devoe & Raynolds Co. Inc., in the industrial sales department, has become associated with the Coatings Corporation in similar capacity—Coatings Corporation, 80-92 Vesey St., Newark, N. J.

Improve your finish ! !

You can do it with . . .

1900 WATEROIL

AS A FINAL clean up polish and as a rubbing oil. Miscible in water. Completely eliminates bluish bloom or haze. Leaves no finger marks. Does not accumulate dust or dirt. Costs less than ordinary rubbing oils.

Additional *"Unquestionable Quality"* Products:

Wateroil Stains
Quick Drying Fillers
Lacquers - Sealers
Thinners
Lacquer Shading Stains
Stain Powders

V. J. DOLAN & CO., Inc.

1830-32 N. Laramie Ave. Chicago

Refinishing Wood

Showcases and Store Fixtures

by M. M. Miller

A TREMENDOUS quantity of wood products is refinished annually. Practically every concern manufacturing finished products of wood has occasion at times to do refinishing work; these are in addition to the numerous individuals and firms which actively solicit and specialize in this sort of work.

Different conditions make refinishing necessary. Old age or usage may have sapped the life from the original finish, and a refinishing job will make the surface (if sound) practically as good as new. A finish that has lost its luster can be brightened up by cleaning, recoating and touching up.

A color or finish that is undesirable is often changed to another. This change is the means by which some manufacturers have been able to move dead stock. Goods are often damaged by shipment, fire, acid, or water, and refinishing is necessary. In the case of store fixture work there is much refinishing of old or used fixtures to match others being used in the same store.

Estimating Costs

The problem of estimating quotations on refinishing work is a complicated one; it takes a man intimately acquainted with finishing processes and procedure to be able to estimate intelligently without tacking on too much or suffering the danger of a loss. We know, to our grief, that an ordinary salesman can cause no end of trouble through misunderstandings by quoting on a job which, to be done properly, may cost several times more than his estimate.

"Preparation" a Big Factor

Usually the largest indeterminate factor in the cost of refinishing is: "What must be done to the present finish before the new finish can be applied?" There may be the case of removal of the finish down to the bare wood. For example, if the present finish is mahogany and the new finish is to be a natural wood transparently finished, then the old finish must be removed entirely and the wood sanded and scraped until its original clean surface is restored. If the new finish is to

1933!

Unexcelled

ALCOHOL RESISTANCE!

Full Body

1834
A. R.
CEL-U-LAK

Smoothness

Hard and Tough

For Data and Samples Write

Priced Fairly

THE VARNISH PRODUCTS COMPANY

12900 Berea Road Cleveland, Ohio

The TAYLOR SYSTEM of COLOR HARMONY

COLOR HARMONY exerts a powerful influence on sales of finished articles— . . . and the Taylor System of Color Harmony solves the problem of selecting color combinations easily, quickly and always harmoniously. This system is based on fundamental, natural color laws, but is reduced to such simple chart form, that anyone can readily understand and use it—there are no books to read—it's right before you in color. No waiting. No guessing. You simply select the base color for your scheme and the Taylor Keyboard automatically shows all the colors that harmonize with your base color. *Discords of color cannot appear through the mask.*

Chart "A" of the Taylor Color Harmony Keyboard is 22 x 15 inches and shows 96 different colors. It is accompanied by two black cardboard masks which can be adjusted to show four different tones of each color. Price $5.00.

Practical Publications, Inc.

802 Wulsin Bldg., Indianapolis, Ind.

be the same or a darker color than the present finish, then removing the finish without scraping the wood is usually sufficient. In this latter case also, if the old finish is not badly marred and the same color is desired, a wash down or sanding, together with touching up and recoating may be sufficient.

The time spent on removing the finish—even on the same wood and type of finish—will never be the same, and estimating closely on this part of the work is a gamble at best. The age and quality of the original finish, the materials used, etc., all affect the time required for removal. Cheap finishing materials are the easiest to remove. From our experience, high grade lacquer and varnish are equally difficult to remove. Shellac may be termed the easiest, although I have seen shellac finishes that were anything but easy to remove.

How to Tell, "Varnish or Lacquer?"

Some finishers believe there is an appreciable difference between the removing of lacquer and varnish, and endeavor to find out what type of finish is on the product before making their estimate. I know of no ready way that a lacquer finish can be distinguished from a varnish finish—after the finish has been on for a number of years. It takes an experienced man to note the difference. Varnish can be detected by its odor for about three years. Often it crazes more and has a softer film than lacquer, but this is only comparative. Lacquer, if scraped off, powdered, and mixed with lacquer reducer "goes back to lacquer," whereas varnish will not do this. Varnish can often be detected by its characteristic odor while being removed with varnish remover.

Other Factors Affecting Cost

Important points to consider in estimating the time for removing the finish on a job are: 1) the amount of curved work, moulding and intricate shapes included; 2) whether the work must be done on location or in the factory; 3) whether the removing must be done with the work in an upright position or lying flat, and 4) the type of individual pieces involved. When the finish must be removed while the surface is in an upright position, the job takes more time than if the work can be handled lying flat, as is explained later on in this article.

Removing the Finish

Old finish can be removed by: 1) sanding off; 2) by use of alcohol and steel wool, and 3) by use of varnish or lacquer removers. There are varnish removers on the market which give splendid results. The remover we use is composed of alcohol and benzole in a half-and-half proportion. When the remover is used to remove a finish on work that must be handled in an upright position, we add 1-lb. of melted beeswax to five gallons of the 50/50 mixture of alcohol and benzole. The wax enables the remover to bite into the finish and eat it away instead of flowing off too rapidly. The disadvantage of using wax is that it must be carefully washed off with alcohol and steel wool before the new finish can be applied.

If the new finish desired is the same shade or darker than the old finish, the surface can be washed down with varnish remover; then scrubbed with alcohol and steel wool; then stained and

wiped to a uniform color and recoated.

If the new finish is to be a lighter shade than the old, wash down the old finish with varnish remover; then scrub the surface with a mixture of three parts of alcohol and one part of ammonia, using steel wool and pumice stone. If this is not sufficient to clean it, scraping will be necessary.

Cheap Short Cuts

Oil stain, with the exception of a penetrating oil stain, does not penetrate as much as a water stain and is easier to remove.

Many finishers often employ short cuts which, while not always making for the best work, may be good enough for the job desired. These may occur in the changing of colors. For instance, if it is desired to change a red mahogany finish to a walnut finish, the old red mahogany finish can be partially removed, washed off with alcohol, and then enough of a green stain added to bring the red up to the brown walnut desired, and the whole recoated—often with a colored lacquer or varnish to complete the shading. This method works better on uniformly porous woods, such as gum, birch and other hardwoods.

Another method is to use a green aniline stain over the old finish to get the color desired. However, this method does not wear as well, and the aniline stain tends to hide the grain of the wood, therefore not making as clear a finish as may be desired.

To Prevent Bleeding

A great deal of refinishing is now being done with lacquer enamels. A job in a finish such as red mahogany may have to be changed to a light green enamel. In doing this enameling over the old lacquer or varnish work there is danger of the old work bleeding through and discoloring the new.

Shellac seems to bleed easier than lacquer or varnish, the latter two being about the same. To prevent this bleeding the old coatings must be sealed in. This we do by applying a coat of aluminum bronze mixed with dryers. A coat of clear lacquer is also helpful. Do not sandpaper the old finish coating before applying the sealing coat or enamel, as this sanding cuts through the finish and makes it easier for the bleeding to take place.

A Color Harmony system has been evolved which simplifies the problem of selecting color combinations easily, quickly and always harmoniously. The system is based on fundamental, natural color laws, but is reduced to such a simple chart form that anyone can readily understand and use it. You simply select your base color for your scheme and the color chart automatically shows all the colors that harmonize with it.

Porcelain Enameled House

The world's first porcelain enameled house, built in Cleveland, Ohio, by the Ferro Enamel Corporation, has been purchased by Mr. C. D. Clawson of that city. The Ferro house is a prefabricated structure, built to demonstrate the advantage of porcelain enamel as an architectural finish.

The porcelain enamel was applied in the form of shingles over a steel frame. Ferro-Clad sheets, consisting of two sheets of steel on either side of fibre insulating board, were fastened to the frame work and formed a base for the shingles.

More than 30,000 people have visited the World's First Porcelain Enamel home since its erection last fall. There are many unusual porcelain enamel features inside.

What's New - -

« « » »

Wax for Many Uses

Emuwax is the name of a new water-dispersible wax recently introduced by the Glyco Products Co., Inc., of Bush Terminal, Brooklyn, N. Y. It is arousing interest because of its great flexibility, light color and emulsifying properties. It is soluble to a greater extent than natural waxes in organic solvents. It disperses readily in hot water to give milky emulsions. It acts as an emulsifier for oils and waxes for polishes, creams, lotions, textile rubber softeners and lubricants. Emuwax melts at 115.8°F. and will not turn rancid. It is offered at a lower price than beeswax which it replaces in some cases.

Clear Durable Waterwhite Varnish

The Rowe Paint Co., 43-42 Tenth St., Long Island City, New York, announces a waterwhite transparent, synthetic-gum varnish called "Rolox" which is remarkable for its, 1) elasticity, 2) adhesion, 3) durability to outside exposure, 4) retention of gloss, and 5) retention of its waterwhite transparency.

According to the manufacturer, the synthetic-gum from which Rolox is made is an unusual one—waterwhite, glossy, tough and very elastic. The varnish is furnished at a body ready for brushing or application by a coating machine. For spray application, a slight thinning with turpentine or substitute turpentine may be necessary. It levels out smoothly.

Rolox will air-dry in four to eight hours. It sets dust free in two to three hours. The varnish can be baked in a box or stationary oven from 40 to 60 minutes at 180°F., or in an automatic or conveyor oven at 220°F. for 20 minutes. At higher temperature it commences to discolor slightly, therefore a high temperature should not be used when color is important.

This Rolox waterwhite varnish makes an excellent protective finishing coat for polished or color decorated finishes on metal, particularly on articles or surfaces which are subjected to outside exposure.

Permite Resalum—New Aluminum Coating

Among the many interesting improvements on the 1933 Dodge cars is the new aluminum coating of the motor block, manifold and exhaust pipe.

This coating, called "Permite Resalum," is a new product of Aluminum Industries, Inc., Cincinnati, Ohio. Heat-resisting Permite Resalum was adopted by Dodge engineers after exacting tests of many heat-resisting paints. It is said that Permite Resalum showed outstanding advantages in these 200 hour tests, during which manifolds reached a temperature of 1400° F.

This new aluminum coating is ready-mixed in a synthetic resin vehicle. By the use of Permite thinner, just the right consistency can be obtained for spraying, brushing or dipping. Where an aluminum finish is desired, therefore, its application is apparently unlimited.

Since the special type of vehicle

IMPERVIOUS
FINISHES

For Industrial Use

Pyroxylin Lacquer
Finishing Varnishes
Synthetic Enamels
Baking Enamels
Primers and Surfacers

ENAMELS · IMPERVIOUS · LACQUERS · TRADE MARK · IVCO · PRODUCTS · VARNISHES

IMPERVIOUS VARNISH Co.

KOPPERS BUILDING PITTSBURGH, PA.

M&W.Co 1876

THE NEW FINISH
- CHECKLAC -

The border shows in natural size two patterns of the structure of a new, attractive, practical and durable two-coat antique checked lacquer finish. It is inexpensive and may be applied on articles of metal or wood over clear or colored lacquer. Enhance the beauty of your products and increase sales with CHECKLAC.

Your inquiry is invited.

MAAS & WALDSTEIN COMPANY
Executive Offices and Plant
430 Riverside Ave. Newark, N. J.

Chicago Office & Warehouse
1115 W. Washington Blvd.

Los Angeles Office & Warehouse
1416 Enterprise Street

used allows thorough leafing of the fine aluminum powder, complete coating or coverage is attained with an unusually thin mixture. In this way costs of this metal protecting coat are extremely low; in fact, it is reported that on the motor finishing job, from 14 to 16 motors are coated with one gallon of Permite Resalum, where only four to five motors were finished with a gallon of the old style oil paints formerly used.

Permite Resalum is made in two grades — Heat-Resisting and Non-Corrosive—and is recommended by the manufacturers for all surfaces, either inside or outside.

Denatured Alcohol Formulas

In connection with the authorization of new formulas No. 5-A and No. 10, and approved modification of No. 5, completely denatured alcohol, Formula No. 5, has been improved by substituting for "alcotate," a new petroleum product known as "calorite." The formula has been strengthened, and will be more acceptable commercially by reason of modification of odor. The research staff of the Standard Oil Co. of California has been very helpful in the development of this denaturant.

Completely denatured alcohol, Formula No. 5-A, introduces a new product, "Pontol," which is a complex mixture of secondary and tertiary iso alcohols with other compounds. They are extremely difficult to remove from alcohol, and afford very effective denaturation. The research staff of the Dupont Ammonia Co. has been instrumental in developing this new material.

Completely denatured alcohol, Formula No. 10, contains as its basic denaturant a new wood distillation product developed by the staff of the Tennessee-Eastman Co., Kingsport, Tenn., a wholly owned subsidiary of the Eastman Kodak Co. It is the result of many months of work by the chemists and engineers engaged in wood chemical technology. "Tecsol" is the name of this new material.

A technical committee of the Industrial Alcohol Institute and the research laboratory of the Paint, Oil and Varnish Association cooperated with the chemists of the Bureau of Industrial Alcohol in this work.

These formulas represent a commercial advance, as well as being adequate to protect the Government's interest. The formulas are non-toxic. They provide broad sources of denaturing materials and are a fine example of coordination of Government and industrial research.—J. M. Doran, Commissioner.

An instrument can be had which will spread a specific thickness of finishing material—useful for testing opaqueness, etc.

Marbleized Effects are now successfully being produced on kitchen cabinets and other products by silk-screen plates. A marbleizing silk-screen plate gives an exact reproduction of marble, for the plate is made photographically, directly from a slab of marble. This method of marbleizing is said to be very economical as compared to other methods.

Porcelain Blackboard

The Ferro Enamel Corp., Cleveland, Ohio, announces a porcelain enameled blackboard, the finish on the board having been especially developed so that it functions perfectly in schoolrooms, laboratories and wherever blackboards are used.

Shellac Sample Cards Free

The Universal Shellac Stick Co., 28 Howard St., New York City, "manufacturers of the largest and most complete line of shellac and lacquer sticks for burning in," have been distributing their new sample cards to the wood-finishing supply houses throughout this country and Canada. Any jobber not receiving his sample card of Bull Dog Quality Sticks is invited to write for it, mentioning this Magazine.

Why Electric Ovens?

WHATEVER may be the specific requirements in an oven used for finishing—whether it be an oven for the baking of enamels, or for the bluing of steel parts—one factor of those requirements will always remain the same; this is real even heat distribution throughout the oven, so there will be no possibility of "hot" and "cool" spots, to overheat or to underheat portions of the charge. To the end of obtaining perfectly even heat, it must be admitted that electricity lends itself admirably, since it is a simple matter to determine by test just where the heating units must be placed, and how they must be arranged. Electric ovens are available to meet all finishing requirements.—J. H. N.

Buying Quality; Mixing Brands

IN THE PURCHASE of finish materials where the value is difficult to ascertain by immediate tests, the buyer must take into consideration other things than the unsupported statement of the salesman. No business ever successfully attained large volume except upon the basis of giving value for price. In these days of extreme competition the wise business man acquaints himself with the needs of his customers, avails himself of all the means found in science and skilled labor for the manufacture of products that will best serve the purpose for which they are intended.

Admitting the possibility of others producing the same results, he fixes a selling price that will be just to himself and to the buyer. Sometimes the large producer can, by reason of his more extensive resources, either give better value for the money or cut the margin of profit.

Competition always rules and regulates prices proportioned to values, but honest competition does not always exist, and too often the desire to make a sale leads to offering materials at low prices under false assurances. The salesman who serves his customers with suitable materials of uniform quality, who maintains the standard of his product and delivers the goods promptly is a "sure winner," while the purchasing agent who looks only at the first cost, ignoring quality is equally a "sure loser," as is also the one who sells him misrepresented materials.

In the finishing room, a reliable and well known make of finishing materials may be used with excellent results, but often they do not apparently value that particular brand. Within a short time a generous order is given to another salesman for an entirely different make of goods at a much lower price. Perhaps a few weeks later another house is favored with an order. This plan is so general that it is no uncommon circumstance to find finishers who are using finishing products from three or four manufacturers for the same purpose.

Frequently a finisher acquires the habit of mixing the materials of different makers in order to combine, as he thinks, the good qualities of each. This practice is a very grave mistake. I can not see how a finisher, using such a course, can expect to obtain uniformly good results. I have often noticed that those who have the strongest tendency for using three or four makes of materials for

ROLOX
WATER WHITE
Transparent Varnish
. . . . . *An outdoor exposure finish for*
Metal Surfaces

An ideal metal protective coating; a clear water white synthetic varnish that is elastic, has superior adhesive qualities, retains its gloss and resists abrasion. Can be brushed, sprayed or rolled on by machine. Levels out smoothly. Air dries in 4 to 8 hours; is dust free in 2 to 3 hours; bakes at 180° to 220° F. without discoloration. Send for literature which proves, by various severe tests, the remarkable merits of ROLOX as a clear water white finish for weather exposed surfaces.

ROWE PAINT CO.
43-42 Tenth Street
Long Island City, N. Y.

• *For a Quicker Start in the Morning*
• *For Uniform Finish at all Times*

AGITATE *the* DIPPING TANKS
by an Alsop Mixer

ALSOP ENGINEERING CORPORATION
39 West 60th New York N. Y.

A Size for every Tank
1/10 hp. to 20 hp.

the same work are usually the ones who are experiencing the most difficulty in their finish.

Absolute knowledge as to quality can only be acquired through practical experience, but faith as to quality can become established through the experience of others, from the general reputation of the manufacturer and the extent of his business, and more particularly by his reputation for the maintenance of the standard products which he has placed upon the market. In order that the highest satisfaction may be secured, there remains considerably more than a haphazard "go as you please" application, and because this fact is frequently overlooked, the best finishing materials are often condemned. If employers will exercise more care in their judgment, not only of their finishers' efforts but also of the merits of materials used, less trouble will be experienced in the finishing room.—J. E. GREENE (Industrial Engineer)

Veneer May Cause Checks

AFTER INVESTIGATING some complaints about the checking of finishes on fine veneered wood surfaces, I have found that often the finish was not at fault. It was the veneer—or rather the manner in which the veneer was conditioned and handled previous to and possibly after the gluing operation. If the moisture content of the veneer is not properly controlled within certain limitations before and after gluing, shrinkage or swelling may occur after the surface has been finished, and this will usually cause cracks or checks to appear in the finish.

The fine face veneers now em-

ployed are so thin that they absorb moisture quite readily. The strength of the already thin veneer is further reduced by more or less sanding or scraping and polishing, after it has been glued.

The type of check or crack in the surface film should indicate whether or not the veneer has caused it. A long thin hairline check following the grain of the wood can usually be attributed to changes in the moisture content of the veneer or wood under the veneer. Excessive shrinkage can cause an upheaval of the film which is very pronounced under a magnifying glass or when the hand is drawn over the surface. A series of cracks or checks that are short and irregular, usually running across the grain of the wood, can be attributed to improper materials or very severe sudden climatic changes.

A well balanced clear wood lacquer should be one constructed of elastic materials that will contract and expand with the wood surface.—R. C. MARTIN.

Snell's New Chemist

Dr. J. Mitchell Fain, Consulting Chemist, is now associated with Foster D. Snell, Inc., 130 Clinton Street, Brooklyn, N. Y.

Letters - - -

(Continued from page 7)

in reddish brown, tan and dark brown. I am sure if these folks manufacture stains for wood, the stains will apply with equal success to this material.

We shall be only too glad to submit to manufacturers, samples of this material that we desire to stain, for the stain they would recommend and quotations on same.—L. L. Co. (Kits)

Ventilator Fans

Our distributor in Mexico writes as follows:

"We have had several inquiries for ventilator fans for paint shops. I understand there is a new fan that works in connection with a suction tube which catches the paint and makes it available for use again. I have heard that the Ford Motor Co. uses this system. The companies that use only the ventilator fan complain that the paint sticks to the fan, and it is necessary to clean the fan each week."

If you know of anyone who makes a ventilating fan similar to this we would appreciate you giving us their name.—U. T. Mfg. Co. (Paint Spraying Equipment.)

Statuary Bronze Finish

We are interested in the best method of obtaining a dark and light statuary bronze finish, free from streaks, spotting and uneven color. The finish desired is smooth and shows no evidence of these objectionable defects.

The fixtures are in sections, each section being 17-ft. long, 24-in. wide and made of extruded naval bronze moulding.

We also would be pleased to be advised as to the size of tanks re-

VARSEAL
THE LATEST THING IN SEALERS
Equally Satisfactory Under Varnish or Lacquer
A Distinct Saving Over Shellac
THE GILBERT SPRUANCE CO.
Richmond and Tioga Sts. Philadelphia

PAISPEARL ESSENCE

"Standard of Quality"

Paispearl Finishes

Create a new vogue appealing to women.

Women are responsible for most purchases of finished products.

Try making your product more attractively appealing and increase your sales by using

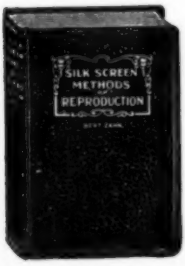
PAISPEARL

PAISPEARL PRODUCTS, INC.

65 Nassau St. New York, N. Y.

Prompt deliveries on any quantity

SILK SCREEN METHODS of REPRODUCTION



THIS new book is intended for Sign Painters, Card Writers, Display Men, Furniture Decorators, Novelty Manufacturers, Glass Etchers and For Domestic Use.

Every detail of the silk screen process is presented clearly in detail. All equipment is fully described and its use illustrated. All materials needed in the various kinds of silk screen work are mentioned with respect to their use to advantage. Estimates of costs and prices to charge are given.

Fully illustrated by the Author. Leatherette Binding. Size 5x7½ in. 160 Pages. 87 Illustrations (Some in color.) Boxed.

Price...$3.00

Practical Publications, Inc.

802 Wulsin Bldg. Indianapolis, Ind.

quired, if necessary, and the kind of material from which they are constructed, and the number of tanks necessary; also the composition of the solutions and whether used hot or cold, manner of applications, etc.—Ornamental Metals Division of C. Brass & Chandelier Works.

To Stain Spanish Gut

One of our subscribers has asked us a question which we think you may be able to answer. He writes as follows:

"We are desirous of obtaining a formula, or method for staining Spanish gut and Japanese silk of natural finish to a mist color, also to the color known as 'coffee color.'"

If you are in a position to give us this information or know of someone who can, we would be pleased to hear from you.—*Sporting Goods Dealer.*

Wallpaper Lacquer

1) We are interested in securing further information together with sample and wholesale prices covering the wallpaper lacquer, as described on page 13 in January issue.— E. B. (Paint Spray Engineers)

2) Will you please give us the name of the manufacturer of the wallpaper lacquer mentioned on page 13 in January issue?—B. & Co. (Planing Mill)

3) In looking through the January issue of INDUSTRIAL FINISHING magazine, we notice an item under the title "Wallpaper Lacquer" on page 13. We are vitally interested in a material of this type and would appreciate having you supply us with the names of several representative manufacturers on this material, with a view to our handling it here.—T. & R. Inc. (Lacquers, Paints, Varnishes)

Stratosphere Balloon Finish

Professor Auguste Piccard, famous for his ascent into the stratosphere, who is now on a lecturing tour of America, used an American made finish on the cabin of his balloon on the recent ascension because of the fact that it fulfilled the special requirements demanded for the scientific voyage. This finish is made on an entirely new formula with a synthetic resin base, and was chosen because, among other things, it was not absorbent to the sun's rays and, therefore, would prevent the creation of heat in the cabin,

and also it would be resistant to mercury, in case this expanded on the trip. A further point was that luminosity was necessary for the interior of the cabin due to the reduced dimensions of the portholes.

The finish was used on both the inside and the outside of the cabin. Professor Piccard, after the ascension, reported that the product was successful for all the objectives intended. He stated as follows:

1) We had good luminosity during the ascension in the interior of the cabin.

2) The adherence of Dulux to the aluminum and the protection against mercury were perfect, the enamel forming one body with the metal.

3) The reflection of the heat bearing rays of the sun was such that during this second ascension we suffered from cold. During the second trip the temperature in the interior of the cabin was 40°C. (72°F.) lower than it had been during the first trip.

4) On landing and in the subsequent transport of the cabin it was dragged over a granite-like earth, and as a result sustained a certain number of dents and scratches on its exterior. However the Dulux did not in any way chip off. It was carried away in places with the upper layer of the aluminum just as if it had made one body with it.—E. I. D.

Testing Drying Time

We note, on page 48 of December issue of INDUSTRIAL FINISHING, a paragraph indicating that there is an instrument for testing the drying time of finishing materials. We would appreciate any information you can give us regarding this.—X & C. Mfg. Co. (Steel Container Specialties).

Wax for Polished Metal

We are interested in B. S. E. Co's. inquiry on page 42 in December issue, concerning a protective weatherproof coating for bronze revolving doors.

While we can furnish both varnish and lacquer suitable for coating bronze we have another product which may interest you more. It is a wax emulsion having very good weathering properties and about four times the covering power of a good lacquer. It can be applied by brush, spray, or cloth rag wet with the liquid and wiped on smoothly. It dries to handle in five to ten minutes, depending upon temperature of the room, and is fairly water repellant in one hour. This repellency increases considerably over night and the film becomes more hard, gradually, with age. We have had metal panels coated with this emulsion on outside exposure for several months with excellent results.

We would recommend its use to replace the unsatisfactory oil coating now applied which, as you say, does show finger marks badly. For application with spray gun it will require some change in technique to prevent runs. The air pressure should be increased over that used for lacquer, while the material supply should be reduced considerably. The gun should be held farther from the work than with lacquer, and a fairly dry spray applied.

In addition to producing a more economical protective coating at the factory, this wax can be applied easily by the building owners when it becomes necessary to renew the finish. Gasoline quickly removes the old film.—P. & I. Inc.

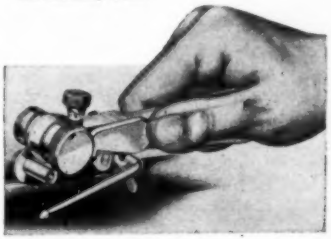
Dependable Industrial
FINISHES
Varnishes—Paints—Enamels—Japans—Stains
Lacquers — Special Finishes — since 1865
THE CINCINNATI VARNISH CO.
Division of The Foy Paint Co., Inc.
Cincinnati . . . . . Ohio

The Mechanical Striper For Industrial Plants

Here's the striping tool for industrial use — to apply stripes on furniture, office equipment, refrigerators, toys, turnings, airplanes, automobiles, trucks, etc. Rolls on stripe easier and quicker and at less cost. Easy to adjust and operate — any inexperienced workman can use it.

Price Only $19.50 Order one TO-DAY! Shipped on 5-days' approval. Money refunded if not satisfactory.

Motor Industries Co.
La Crosse, Wisc.



Industrial Finishing
MAGAZINE

Distributed to Executives and Foremen Finishers in industrial plants where finishing coats are applied with finishing equipment

Published the 15th of each month by
PRACTICAL PUBLICATIONS, Inc.
222 East Ohio St., Indianapolis, Ind.
Telephone.....Riley 6771

President.....A. T. Gaumer
Vice-Pres. and Editor.....W. H. Rohr
Treasurer and Adv. Mgr. .....E. A. Dosch
Secretary.....R. E. Sults

Subscription Rates Per Year
U. S. and Possessions.....$2.00
Canada and Foreign Countries.....$3.00

EDITORIAL

"Upward-Trend" Industries

Two industries that offer promising possibilities now and in the future are those having to do with the manufacture, installation and servicing of oil burners and air conditioners for heating and conditioning the air in homes and in practically all kinds of buildings. The products of both industries require metal cleaning and finishing operations in their process of manufacture.

The oil burner industry now has a sales volume of $400,000,000 annually, and air conditioners will probably reach if not surpass this figure within a short time. Both industries are doing considerable advertising in various ways to familiarize the general public with the merits of their respective products.

Air, properly conditioned as to temperature, humidity and cleanliness, is of utmost importance not only in the interests of health and comfort to people living and working inside, but also in the manufacturing process of many important industries, including all those that have anything to do with finishing.

1933—Value Year

Three years of steadily diminishing volume sales in the majority of industries have changed the conditions prevailing several years ago when practically anything would sell easily at a good price. Manufacturers have been forced to present better values, and they have confronting them the difficult task of proving their products are better. In the industrial fields especially, buyers have become very critical and are demanding that the goods they buy meet certain strict requirements—particularly as to uniformity of grade, durability and general dependability.

Exhibitions Draw Crowds

We draw a suggestive and significant reminder from a recent news release which tells us that:

"The novel character of the exhibition of New Materials, New Products and New Uses assembled by the National Alliance of Art and Industry, on view in the Art Center Building, 65 E. 56th St., New York City, is attracting large audiences.

"Many of the important industries of the country show both basic materials and novel products which have recently been developed from these materials. The exhibit is, consequently, rich in suggestions for the designer on the look out for new mediums, the decorator seeking novel materials adapted to the purposes of modern living; the business man in search of possibilities, or, in

fact to anyone who enjoys seeing novel 'gadgets'—which include household materials from furnaces, sinks, ventilating and air conditioning equipment to beverage mixers and fascinating electrical what-nots."

The majority of people in the United States are more or less industrial minded—eager to learn about, tell about and use what's new. More exhibitions of industrial products should be presented in every section of the country, and more intelligent effort should be directed toward disseminating among those interested, the information they so eagerly seek.

Of course, many interested concerns and individuals can not be reached at the exhibitions, or even through salesmen. Whoever directs the publicity for any product must also keep in mind the fact that it is not enough to reach people with your message. *You must reach them and impress them, and keep on reminding them in different ways.*

Fix Up, Modernize, Beautify

A brand new Clean Up and Paint Up window display in ten brilliant colors of real paint is announced by the National Clean Up and Paint Up Campaign Bureau for 1933.

The new display features both interior and exterior painting, varnishing and decorating, refinishing of furniture, and repairing and modernizing of property, with a big red "N O W" to emphasize immediate action. Supplementing the picturized suggestions are admonitions to "Clean Up—Paint Up—Fix Up—Modernize—Beautify—Renovize."

Zinc coated sheet steel having an etched surface to take any finishing material, is announced.

Masking Tape Stripes

ASIDE from the simple proposition of protecting adjacent parts from being painted when it is not desired, there are many special decoration jobs that can be quickly and neatly performed by means of masking tape and masking paper. An instance is the making of a straight, neat stripe. This can be done by using a snap line first, for a guide in positioning the tape and paper. Then the tape may be laid right along the line or lines, as the case may be. Of course, it is a little bothersome and slow for one man to combine tape and paper, unless he is supplied with a special tape and paper dispensing machine that automatically attaches one-half the width of the tape to the paper as it is pulled from the device. With this at hand, the masking is laid in a jiffy, the stripe is sprayed or brushed, and the aprons are pulled away. The masking material can be used over again repeatedly.—R. E. L.

Pressure Containers Help Small Shops

ATTENTION paid to mass production methods is neither so concentrated nor so sustained as it was some time ago. Of course, on some lower-priced products which are manufactured for that portion of the market that buys entirely on price, mass production will continue in order. But the greater bulk of the future market is going to tend toward welcoming that which is distinctive, which combines novelty with utility.

The small shop with a limited amount of equipment must therefore select equipment with an eye

CROWN 12B SPRAY GUN

PRICE $13.00

Provides all the essential features found in higher priced spray guns at an unusually low price. Full fan spray in all positions. Round spray for close work. Instant fluid adjustment to suit each type of material. May be used with hand container, gravity or pressure paint container. Write for full details.

CROWN SPRAY GUN MFG. CO.
1218 Venice Blvd. Los Angeles, Calif.
Boston, 105 Broad St.; Newark, N. J.
1057 Bergen St.; Chicago, 551 W. Lake St.
Houston, 1027 E. 11th St.

The MIXING of COLORS and PAINTS

COLOR Formulas and Useful Color Cards. Description, Properties, Theory, Harmony and Management of Colors. Color Use and the Mixing of Colors and Paints for Interior Decorating, House Painting, Arts and Crafts, Furniture and Polychrome Finishing. Color and Light; Description of Color Pigments; Properties of Color Pigments; How Colors Are Prepared for the Trade; Basic Paint Pigments; Painting Oils; Volatile Thinners and Dryers; General Paint Mixing Methods; Color Theory, Principles and Use; Colored Paint Mixing Methods; Mixing Special Purpose Materials; Color Harmony and Management; Selecting Color Schemes; Printing Inks.

296 Pages, Fully Illustrated with Color Chart and Drawings, Cloth. Price. **$2.00**

Practical Publications, Inc.
802 Wulsin Bldg. Indianapolis, Ind.

to its versatility; this is undoubtedly why pressure-feed containers—which are fitted with inner liners, making possible a change of colors fed from the container without cleaning—are fast growing in popularity. Not only do they save the time which would otherwise be spent in cleaning, but they also save a certain amount of material at every change.—H. L.

Metal Protective Paint

PERHAPS it cannot be fully established who it was that glorified graphite by giving it the high-sounding name of plumbago, but considering the value of the material in its various uses, it is probably entitled to a distinctive name, at that. The molder in the foundry gives the face of his mold a light coat of plumbago before the metal is poured, and it forms an impenetrable surface which will not allow sand particles to fuse with the metal. A smooth-faced, blue casting is the result. Small wonder, then, that this material is inert to gases, acids and alkalies, heat and cold, and that it should find its way into paint form. The graphite flakes overlap when spread—much like fish scales, aluminum paint, shingles, etc., and it is especially good for metal protection.—L. H. Y.

Churns Mix Paints

SPEAKING of business acumen, what could be a bigger factor in this desirable characteristic than the ability to ferret out every possible use to which our product is or can be adapted, and then make full use of each one as a market? Not infrequently, some manufacturer finds that his prod-

uct is wonderfully well suited for sales in some field which he had previously overlooked entirely—perhaps without the slightest modification in the product itself. An outstanding case to point is a churn manufacturer who suddenly awakened to the fact that his churns were just as good for mixing paints, lacquers and pastes as for churning butter. And, believe it or not, he is advertising and selling his churns for that purpose, both power and hand models.—JOHN E. HYLER.

Classified Advertising

Advertisements under this heading 45 cents a line per insertion, minimum charge, $1.35. In estimating, calculate six words to one line, and add one additional line for heading. Use this department to obtain help, find positions, buy and sell equipment, dispose of manufacturing properties, etc.

POSITION WANTED

As foreman. 20 years' experience in finishing of hollow metal doors and metal furniture. Familiar with modern production methods. Address IF-462, care Industrial Finishing.

SEVERAL INDUSTRIAL SALESMEN

Wanted, with established accounts to represent aggressive lacquer manufacturer. Extremely liberal straight commission basis on high quality, low priced lacquer enamels, clear lacquer, and stain. Exclusive territorial protection and real plant co-operation. Address IF-455, care Industrial Finishing.

ASSISTANT TO SALES MANAGER

Well-known manufacturer of industrial products, having an established clientele with largest United States plants, will entertain applications from man well versed in the industry, having selling experience and established trade, for position as Assistant to Sales Manager. State experience and references. Location—Cleveland, Ohio. Address IF-458, care Industrial Finishing.

USED SPRAY PAINTING EQUIPMENT

Get my prices on used guns, booths, fans, outfits. Guaranteed. HOVEY SPRAY EQUIPMENT CO., De Vilbiss Distributor, 1509 Spring Garden St., Philadelphia, Pa.

FINISHING FOREMAN

Desires position. Several years as foreman with large firms. Expert on matching colors and finishes. Understands modern equipment, finishing and production methods. Experience on store, office, bank fixtures and antique furniture. Can handle any number of men and organize finishing department from the ground up. Location and salary no object. Address IF-461, care Industrial Finishing.

WANTED

Laboratory oven approx. 4'x4'x4'. Advise make, kind of heat, control, price. WILSON & BENNETT MFG. CO., 6532 So. Menard Ave., Chicago, Ill.

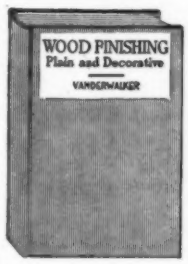
TRY THESE MATERIALS!

Thinners, 40c and 55c gal. Work with every lacquer. Clear lacquer, 65c and up. THE ELDOR CO., G. P. O. Box 234, New York City.

MARVELOUS NEW PAINT SPRAY GUN

Requires no air regulator, handles all types paint, lacquer, etc. Lighter in weight, widest spray, perfect atomization; also air purifiers, 5 and 10 gal. pressure outfits, accessories, etc. Write for Catalog and prices. THE ALEXANDER MILBURN CO., 1416-18 W. Baltimore St., Baltimore, Md.

WOOD FINISHING
Plain and Decorative



A Book of Formulas and Detailed Instruction in Method, Tools and Materials. Period Finishes. Staining, Filling, Varnish, Painting, Enameling, Glazing, Lacquers.

WOOD Finishing in General; Preparation of New and Old Surfaces; Stains in General; Factory Prepared Stains; Water Stains; Aniline; Chemical Water Stains; Color Pigment; Dyewood; Spirit Stains; Oil Stains; Stain Mixing, Brushing and Procedure; Wood Fillers; Varnish and Shellac; Varnishing, Rubbing, Polishing; Varnish Defects; Lacquers; Wax and Oil Rubbed Finishes; Trim; Working Operations; Woods, Brush Graining; Decorative Wood Finishes; Repairing Damaged Finishes.

360 Pages, Cloth ***Price....$2.00***

Practical Publications, Inc.
802 Wulsin Bldg. Indianapolis, Ind.

Here is the first authoritative handbook of its kind. PRACTICAL JAPANNING and ENAMELING contains much information that has never before been published. You will find between its covers facts, processes, and formulae that have been considered secret by many japanners.

The author has actually been doing this work for others for many years and he knows whereof he speaks. No one has ever gone into the subject of metal finishing more deeply than he nor has the subject ever been explained so clearly and effectively. This book was eight years in preparation.

Color plates and a multitude of tables and illustrations make the text even more clear and understandable. The volume is bound in harmony with its companions of the Practical Finishing Series and makes a rich, attractive appearance. . . 22 chapters.

Price $3.50 . . . . *money refunded if book is not satisfactory*

Practical Publications, Inc.

802 Wulsin Bldg.
Indianapolis, Indiana

Index to Advertisers

Alsop Engineering Co. 40
Ault & Wiborg Varnish Wks. ..... Front Cover
Berry Brothers .....
Brevolite Lacquer Co. 2
Cincinnati Varnish Co. 43
Classified Advertising 47
Commercial Solvents Corp. ..... Third Cover
Crown Spray Gun Mfg. Co. 46
Day & Co., James B. 25
DeVilbiss Co., The 8
Dolan & Co., V. J. 31
Egyptian Lacquer Mfg. Co. ..... Back Cover
Hilo Varnish Corp. .....
Impervious Varnish Co. 37
Lacquer & Chemical Corp. .....
Maas & Waldstein Co. 37
Motor Industries Co. 43
Paispearl Products, Inc. 42
Polk & Co., R. L. .....
Revolite Corp., The 7
Rockford Varnish Co. ..... Second Cover
Rowe Paint Co. 40
Spruance Co., The Gilbert 41
Stanley Chemical Co. .....
Sun Oil Co. .....
Superior Sheet Steel Co. 4
Varnish Products Co. 33
Walker Co., H. V. 6
Wilson-Imperial Co. .....
Zapon Co., The 21
Zeller Lacquer Mfg. Co. 1

ZELLAC

Price does not make **VALUE**

Everybody has been forced to reduce prices, of course. But some producers (encouraged by ill-advised "price buyers") have also reduced the merit of their materials to a point where, no matter how low the price, the customer is deprived of a square deal!

Obviously, any manufacturer's integrity and reputation must suffer if he sacrifices the fundamental qualities of his product to price-cutting. Yet that is precisely what some lacquer manufacturers have been doing in the last few hectic years, to the detriment of lacquer users.

The Zeller policy has never wavered during this economic upheaval. Opposed to PRICE-per-gallon brands, Zellac lacquers and lacquer enamels have stood firmly on the Zeller VALUE-per-gallon policy, with of course prices adjusted to the times. As a consequence, our customers know they have been getting VALUE right along, and stick with us.

Specify your needs—use the specific grade of Zellac recommended—then COMPARE on the basis of actual economy!

ZELLER LACQUER MFG. CO., Inc.

20 East 49th Street, New York City

CHICAGO WICHITA
LOS ANGELES SEATTLE SAN FRANCISCO

ZELLER